Claims

1. An apparatus for taking absorbance-based chemical measurements comprising a reagent-based optical chemical sensor comprising an analyte-selective reagent, means for renewing said reagent, means for allowing said reagent to reach equilibrium with an analyte and, means for calculating the sensor response from a ratio of the absorbance of said reagent determined relative to a blank solution.

2. The apparatus of claim 1, wherein said analyte-selective reagent is colorimetric.

3. The apparatus of claim 1, wherein said analyte-selective reagent is flourescent.

4. The apparatus of claim 1, wherein said means for renewing said reagent comprises a pump and at least one valve.

5. The apparatus of claim 1,wherein said means for renewing said reagent is selected from a group consisting of at least one peristaltic pump, at least one syringe pump, at least one positive displacement pump, at least one solenoid pump and valve and at least one pinch valve.

6. The apparatus of claim 1, wherein said means for renewing said reagent comprises a solenoid pump and valve.

7. The apparatus of claim 1, wherein said means for calculating the sensor response includes the equation $A_R = A_{\lambda 1}/A_{\lambda 2}$, where A_R is said sensor response, $A_{\lambda 1}$ is absorbance at $\lambda 1$ and $A_{\lambda 2}$ is absorbance at $\lambda 2$ and, wherein $A_{\lambda 1}$ and $A_{\lambda 2}$ are determined by

$$A_\lambda = -\log \frac{I_\lambda}{I_{\lambda 0}}$$

8. The apparatus of claim 1, wherein said reagent-based optical chemical sensor is a Submersible Autonomous Moored Instrument for CO_2.

9. The apparatus of claim 8, wherein said analyte-selective reagent is bromothymol blue.

10. The apparatus of claim 8, wherein said Submersible Autonomous Moored Instrument for CO_2 comprises a spectrograph filter.

11. The apparatus of claim 8, wherein said Submersible Autonomous Moored Instrument for CO_2 comprises a GaP photodiode.

12. The apparatus of claim 8, wherein said means for calculating the sensor response includes the equation $A_R = A_{\lambda 1}/A_{\lambda 2}$, where A_R is said sensor response, $A_{\lambda 1}$ is absorbance at $\lambda 1$ and $A_{\lambda 2}$ is absorbance at $\lambda 2$ and, wherein $A_{\lambda 1}$ and $A_{\lambda 2}$ are determined by

$$A_\lambda = -\log \frac{I_\lambda}{I_{\lambda 0}}$$

13. A method of taking absorbance-based chemical measurements comprising the steps of:

a) utilizing a reagent-based optical chemical sensor comprising an analyte-selective reagent;

b) renewing said analyte-selective reagent;

c) equilibrating said renewed analyte-selective reagent to said analyte; and

d) calculating the sensor response from a ratio of the absorbance of said analyte-selective reagent determined relative to a blank solution.

14. The method of claim 13, wherein said analyte-selective reagent is colorimetric.

15. The method of claim 13, wherein said analyte-selective reagent is fluorescent.

16. The method of claim 13, wherein said reagent is renewed by a pump and at least one valve.

17. The method of claim 16,wherein said pump and at least one valve are selected from a group consisting of at least one peristaltic pump, at least one syringe pump, at least one positive displacement pump, at least one solenoid pump and valve and at least one pinch valve.

18. The method of claim 13, wherein said reagent is renewed by a solenoid pump and valve.

19. The method of claim 13, wherein said sensor response is calculated using the equation $A_R = A_{\lambda 1}/A_{\lambda 2}$, where A_R is said sensor response, $A_{\lambda 1}$ is absorbance at $\lambda 1$ and $A_{\lambda 2}$ is absorbance at $\lambda 2$ and, wherein $A_{\lambda 1}$ and $A_{\lambda 2}$ are determined by

$$A_\lambda = -\log \frac{I_\lambda}{I_{\lambda 0}}.$$

20. The method of claim 13, wherein said reagent-based optical chemical sensor is a Submersible Autonomous Moored Instrument for CO_2.

21. The method of claim 20, wherein said analyte-selective reagent is bromothymol blue.

22. The method of claim 20, wherein said Submersible Autonomous Moored Instrument for CO_2 comprises a spectrograph filter.

23. The method of claim 20, wherein said Submersible Autonomous Moored Instrument for CO_2 comprises a GaP photodiode.

24. The method of claim 20, wherein said sensor response is calculated using the equation $A_R = A_{\lambda 1}/A_{\lambda 2}$, where A_R is said sensor response, $A_{\lambda 1}$ is absorbance at λ1 and $A_{\lambda 2}$ is absorbance at λ2 and wherein $A_{\lambda 1}$ and $A_{\lambda 2}$ are determined by

$$A_\lambda = -\log \frac{I_\lambda}{I_{\lambda 0}}.$$